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VOLUME 1, ISSUE 1

Journal of scholastic Engineering Science and Management

January 2021

Online Print

EDITION 2021

Open Access Journal

Frequency: Monthly

Chief- Editor

Dr. Mallikarjuna B E

Associate Editor

Mr. Vasudendra H K

Preface

I am Very happy note to that, "Journal of Scholastic Engineering Science and Management" releases its first issue of January 2021 Edition. The journal of Scholastic Engineering Science and Management principally aims to explore advances in research pertaining to applied, theoretical and experimental Technological studies.

The goal is to promote scientific information interchange between researchers, developers, engineers, students, practitioners and Industry professionals. The journal incorporates various research papers as well as case study papers.

The Journal of Scholastic Engineering Science and Management is an open access and peer-reviewed monthly E-journal. It publishes both theoretical and experimental high-quality papers of permanent interest, not previously published in journals, in the field of engineering, applied science and Management.

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Eventually, the readers may directly or indirectly find the appropriate solution in respect of their research work by means of having a keen look at this journal.

I wish to thank **Dr. Mallikarjuna B E,** Professor, Department of Mechanical Engg. IMPACT (Govt-Aided) Polytechnic, Bengaluru for his inspiration, help and guidance extended while smooth running of this E-Journal publication.

I also gratefully acknowledge the help and support of indexing partners for their effective cooperation in the early release of this E-Journal. Perfection cannot be achieved in a single literature, but there is always scope for improvement. Hence the journal manager invites suggestions from the readers to further improve the E-Journal Publication.

Vasudendra H K

Journal Manager (JSESM)

Journal Contents

Article No.	*Name of the Journal Article*	*Page No.*
1	*Consequence of Enterprise Resource Planning in the Environs of Pedagogical Organization.*	***1-6***
2	*Archetypal Case Study of Pupil Service learning in the Paddock of Challenging and destitute Community Based Organizations.*	***7-13***
3	*Influence of Hardening Process Over Modified Heat-Treated Carbon Steel Cutting Tool Materials.*	***14-22***
4	*Realistic case study of transmutation of coke dry quenching expulsion facility to lessen the maintenance work and augment the performance of Vibro feeder line pipe in the department of mechanical coke ovens.*	***23-28***
5	*Impact of thermal treatment process over carbon based single point cutting tool.*	***29-37***

JSESM

Journal of Scholastic Engineering Science and Management

January 2021, Volume 1, Issue 1 pp:1-6

"Consequence of Enterprise Resource Planning in the Environs of Pedagogical Organization"

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ABSTRACT

The application of Enterprise Resource Planning in the prefecture of academic institution, in which it integrated all the academic functions in an individual platform, it was eradicated the external and internal loses, which are by and large being associated with students, faculties, principal and supporting staff of an institution. Here an attempt to install educational SAP software, which integrates and provides the common platform for all the members across the institution. And the principal accesses all the data which is being come out by different departments in respect of student punctuality, absenteeism of the student, faculty's regularity and irregularity to the college and many more. In this work ERP software played an imperative role to enable the academic functions more effectively and efficiently.

Keywords: Enterprise Resource Planning, SAP, Institutional ERP

I. INTRODUCTION

On the prospects of growing community demands, one can have a proficiency to acquire major results by redecorating the existing system in a systematic manner. During eighteenth and nineteenth century there was an industrial era took place, in which number of industrialists and scientists were proposed several management theories to frame the existing system in an advanced manner to eradicate the

problems which are customarily being associated with industrial and non-industrial activities. So, it is meant to say that, the anticipation of advancement in any system whether it is manufacturing environment or non-manufacturing environment could be possible when we make use of real time existing resources like man, machines, materials, money and method. So, the availability of these real time resources enables the manufacturing process very smoothly and efficiently. However, as far as manufacturing industry knowledge concerned, manufacturing is a predetermined activity where it encompasses various firm sub resources namely procurement of materials, inventory process, human resource availability, inspection of incoming materials, distribution, supply chain, customer relationship process and many more. So, regulating the activities of each department is somewhat difficult for gathering the information or departmental data. Presently, all most all the manufacturing firms have espoused integrated software called SAP to enable the manufacturing operations very efficiently and effectively. The integrated software means it assimilates the information and data of each department to enable the manufacturing process and reducing the production time by gathering the information about availability of human resources, availability of materials in the ware house, finding out of defects in finished and unfinished materials and many more. So, in this probe, as like industrial firms the enterprise resource planning software plays an imperative role to maintain smoothness and keep the records of pupils, faculties, account audits decorously in the prefecture of academic area. However, till now the industrialists believed that enterprise resource planning would be applicable to manufacturing industries. Being an engineer if enterprise resource planning is applied to an academic institution, it would be a great profitable thing, in which eradication of examination delay, direct and indirect loses of academic activity could be taken place. To enhance the productivity of any system, it is needed to utilize all the resources effectively. The application of enterprise resource planning in an academic level is a challenging chore for every employer to manage all the departmental activities without making any defect in their academic system. The impact of enterprise resource planning in an academic level would be more effective than the industrial firm. The enterprise resource planning software manages all the activities like recording the student data, regularity or irregularity of faculties or teachers, examination management system, in time delivery of question papers and answer booklets, academic attendance of pupils and circulation of pupil's marks card to their home and many more. In this survey we have assembled the academic information, later we have applied over the academic institution and the results have depicted in the impending part of this paper.

II. ERP PROCEDURE

As we aware of that, managing all the activities which are generally being encountered in an academic institution level, which amounts the assortment of anxiety over the management people. So, after come across these prospects being a management person, it was an essential task to redecorate the academic system with full off automated stuff. So, in this respect, the management person was preferred a polytechnic college for his innovative work, where he was found intricacy administration work, in which the faculties, students, principal and supporting staff were failed to maintain the common platform for acquiring pertinent information from end to end. So, the management person initially, he was gathered the data in all respects of the academic institution, where he was suggested to espouse ERP process to their top management. Later they were acquired exceptional results as like industry. The meticulous domino effect was depicted as per the ERP standards.

So, after espousing ERP process, tremendous changes were taken place within the academic institution where academic delay in respect of student admission process, faculty regularity and teaching information, student records, account audit information, examination management system, students' placement information and many more,

Table 1: ERP Process over the academic institution works

Serial No.	Academic Administration work	Concerned individual	ERP Software System File Codeword	Sub-Central Station (Principal) Codeword
1	Admission Process	Office Workers	Off_Adm_ERP1_01	SCS/P.O. A/ERP_1
2	Faculty Regularity& Absenteeism	Departmental Head	DH_STH_ERP2_02	SCS/P.D.R. A/ERP_ 2
3	Student Information (Record)	Dean Head	HD_S. I_ERP3_03	SCS/P.D.S. I/ERP_3
4	Account audit	Accountant	AC_A. A_ERP4_04	SCS/P.A. A/ERP_4
5	Examination (Including Issuing Hall tickets and Report card)	Examination Management system	EMS_E.X_ERP5_05	SCS/P.E.M. S/ERP_ 5
6	Students Placements	Placement officer	PO_S. P_ERP6_06	SCS/P.P. O/ERP_6

fully declined. The data which were directly acquired from concerned individual was more trustworthy and more internal loses were eradicated. And the data directly went to the sub central station, where it

was accessed by the principal of that academic institution. Later the data were taken by principal he sent the same data to the top management of the institution by means of centralized integrated ERP software. The details were depicted and as shown in below table 2.

Table 2: Sending out of Institution information from Sub Station to Centralized Station

Serial No.	Sub Central Station (Through Principal) Codeword	Centralized Station (Top Management) Codeword
1	SCS/P.O. A/ERP_1	CS_P_ODAEP/ERP1212_HSKP
2	SCS/P.D.R. A/ERP_2	
3	SCS/P.D.S. I/ERP_3	
4	SCS/P.A. A/ERP_4	
5	SCS/P.E.M. S/ERP_5	
6	SCS/P.P. O/ERP_6	

III. RESULTS AND DISCUSSIONS OF INTEGRATED ERP

As we cited beforehand that, the integrated software could eradicate the paper work as well as enhance the productivity of an academic institution. And here the effect of integrated ERP software was expounded and depicted by means of graph. From Fig.1.1 the academic year 2019-21 was having greater productivity as compared to earlier one. In this respect during academic year 1997-2005 the external and internal loses were more and productivity of the institution was less and more paper work was needed. Further during academic tenure 2006-2009 the productivity of the institution was somewhat higher compared to earlier academic year.

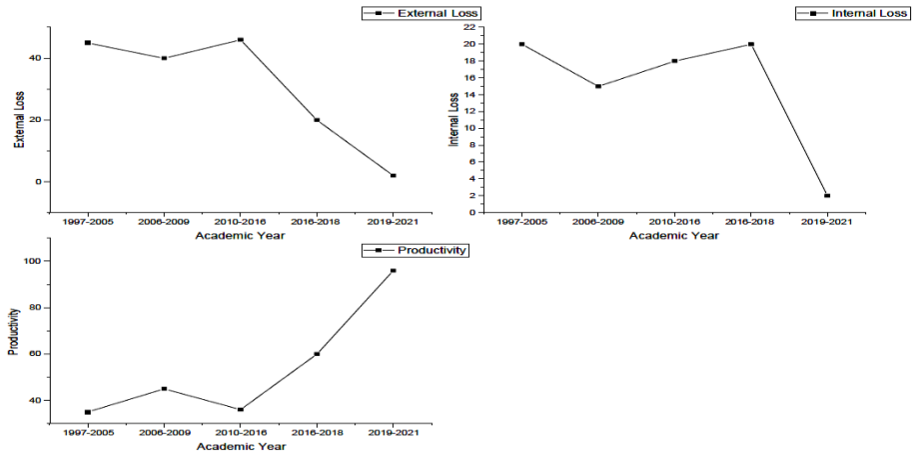

Fig.1.1: Effect of profitable ERP over academic institution

Besides, if we were a look over in the course of 2010-2016 and 2016-2018 the external and internal

losses were less in number and productivity of an institution was enhanced by adopting the enterprise resource planning software. In this regard after implementing the ERP (Educational SAP) software the academic institution productivity was fully enhanced.

CONCLUSIONS

The External and Internal loses have diminished after espousing the ERP. The productivity of an academic institution has wholly enhanced. Have maintained ethical and good relationship with Pupil parents. ERP has greatly reduced the time delays across the institution. It has enhanced the morale of the Teachers, Students, Supporting staff and Principal of the institution.

FUTURE SCOPE

The Educational ERP software can also be implemented in Various universities across the world, Government institutions, offices.

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JSESM

Journal of Scholastic Engineering Science and Management

January 2021, Volume 1, Issue 1, pp:7-13

"Archetypal Case Study of Pupil Service learning in the Paddock of Challenging and destitute Community Based Organizations"

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ABSTRACT

In sight of mechanical engineering aspects, here our students have undergone for two weeks industrial training in a well-regarded industry; there they have applied their class room learning skills in needy community organizations. In which they have resolved the evils which are being associated with machine tools and worker's environment. There they found the satisfactory results after applying class room learning. The acceptable discussions have recounted in impending section of this paper.

Keywords: Service Learning, Environmental Factors, Community Problem

I. INTRODUCTION

In the prospects of professionalism, we come across new innovative things in our day-to-day activities. One can also say that activity or an event must be done by a person who knows the real factual things associated with that activity. In the light of growing science and technology the exposure of an existing academics towards science and technology are to be enhanced by framing the students or pupil in accordance with current technology. So as far as student academics concerned, academic skills which would be taught by faculty to a student must ensure the ability of pupil towards the solving community real life problems by way of facilitating the resources, making projects related to the community, analyzing the problems of community. So as far as ethical knowledge is concerned the service learning is non paid activity, in which service is provided to the community, non-profitable institutions, and charitable organizations by the pupil as per class room instructions, academics should not be limited to certain purview, which must be emerged as a ray of light to design and revolutionize the pupil or student mindset beyond the academic purview. One can scrutinize that service learning is different from volunteer, because in service learning the faculty shall provide an opportunity to the pupil to solve the real-life problems of a community by applying pupil classroom skills. So, in this regard the involvement of pupil plays an imperative role to enable the service-learning process, in which pupil will undergo for community works during their study tenure. As far as community knowledge is concerned, they face problems on respective zone. However, some solutions are obtainable or some solutions are not obtainable. The service combines community service with classroom instruction, focusing on critical and reflective thinking as well as personal and civic responsibility. It engages students in educational process what they learn in the classroom to solve real-life problems. Students not only learn about democracy and citizenship, they actively contributing citizens and community members through the service they perform through experiential learning, research, presentation skills and reflection. The partnership built between community, students, faculty are reciprocal meaning shared responsibility and gain helping students address local needs while developing their academic skills and commitment to their community. Service learning is needed to promote the numerous academic skills, problem analysis, critical thinking, logical reasoning, detailed observation, issue identification. And it also enhances the student learning skills, student retention. By way of doing this it encourages student to engage with civic. So, in this respect, we have espoused service-learning process in which students have undergone to resolve the community-based problems in an effective and efficient manner. We have assigned several tasks to the students of final year

mechanical engineering in which students have obtained exceptional problem solving and problem analyzing qualities together.

II. SELECTION OF COMMUNITY PROBLEM

In this educational approach six students of final year mechanical engineering have visited nearly 10 industrial organizations which are well known across the Ballari (Karnataka, India) city for producing qualitative products. Thereafter industrial organizations have permitted them to undergo for solving the problems which are faced by the workers and organizational members. Students have observed the terms and conditions which are prescribed by the organization. And also, they have undergone for the technical and non-technical observation for a known period of time. After students have analyzed several problems which are being associated with technical work. Each student has made a report to the department head in the course of their technical observation. Students are given an opportunity to resolve the technical evils or troubles which are commonly being faced by the machine worker or operator. In addition to these students have noted down the technical specifications of the several machine tools, furnaces, boiler temperatures, machine tool equipment's and many more and their desired results and contentment which have been found by the students have been expounded in impending section.

III. PROBLEMS IDENTIFICATION

As we stated earlier that the students have undergone for the technical and non-technical observation in which students have noticed and identified several problems in community based industrial organizations (Industry name X, Y, Z) Which are linked to technical and non-technical problems. The major evils or problems have identified by the student are as follows:

- Machine Tool Problem (Technical)
- Working Environment (Non –Technical)

So, in this respect, the students have reported the problems to the department head by way of showing the data which are noted down by them. Initially, students have taught very well about academic subjects which are related to aforementioned ones. Right from the beginning we have provided encouragement to the students to provide the solution for the aforementioned community problem. Three students have provided the solution for the technical problem and remaining three students have provided solution for the non-technical problem.

A). Machine Tool Problem (Technical)

Usually, the operators while performing the machining operations they take lot of care over the machine tool. Our students have observed lathe machine tool which has chuck part for holding the job, tailstock for supporting other ends of the work piece and many more. In order to adjust the chuck according to the work piece diameter, operators would use align key, so for tightening and loosening purpose. align key plays an imperative role, the time taken by the align key for adjusting the chuck material would be more, in turns leads to increase production lead times. So, our Pupils have provided solution to aforesaid problems by way of fixing the spanner material over the align key, in which the operation for tightening and loosening the lathe parts can be adjusted so easily by this method.

B.) Working Environment (Non–Technical)

The second evils which has observed by students are working environment evils, where the members of the organizations are not maintained proper relationship with their colleagues and workers. This leads to de-motivate the workers towards failure of the working operations. And it imposes more over the customer requirements, leading to declining in the production rate of an industry. So, our students have provided solution to the members of organization, in which they have made an arrangement for teaching a Professional ethics and morality subjects to the workers and members. Gradually, the workers have stricken to involve in solving their problem themselves by way of tutor the ethical subjects, which have taught by our mechanical students. In the long run, our students found the desired solution for the non-technical evils. After defrayal the non-technical problems, the pupils have undergone for the two weeks non-technical. observation, in which they have found the smooth functioning of the organization and the workers and organizational members have maintained supportive relationship within the organization. So, the changes of the workers have been recorded and maintained in the organization directory file.

IV. RESULTS ANDISCUSSIONS

For being involved in any work in an industry, the service-learning guidelines have to follow by employee or workers. Many of us have known that service learning is a non-paid activity, in which service is provided on voluntary basis to public, non- profitable organizations, charitable organizations and many more. Service learning plays a crucial role to maintain friendliness between colleagues in an organization. Also, the service learning includes the training and study of real-life problems and gives best possible

solution. The service learning could consist of characteristics of the work, basic requirements, security of the job, awareness of the procedures while taking decisions and actions. Therefore, our students have made report to save the production time of machine tool (Lathe) and the graph of time vs. Lathe part have shown in below Fig. 1.1

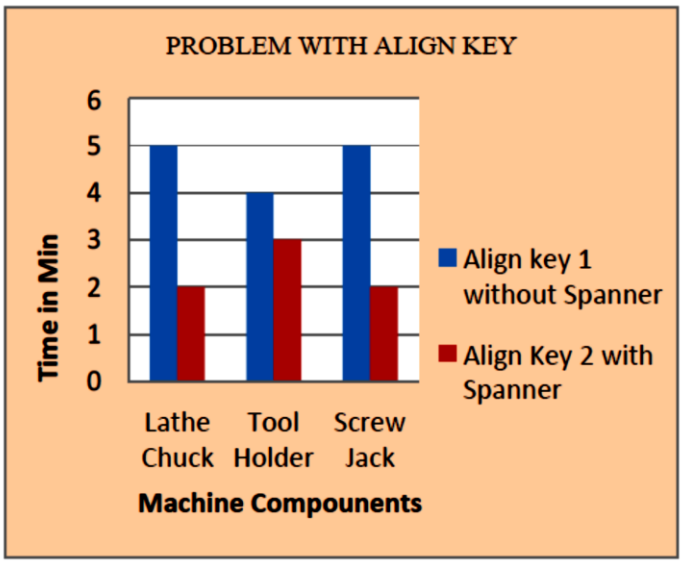

Fig.1.1: Problem with Mechanical Element

From Fig.1.1 one can notice that, without assistance of spanner the production time for quite a lot of mechanical components higher. And also, our Students have noticed that with assistance of spanner the production time has got decreased for all mechanical components. In this regard screw jack component has least consumption time compared to other two mechanical components.

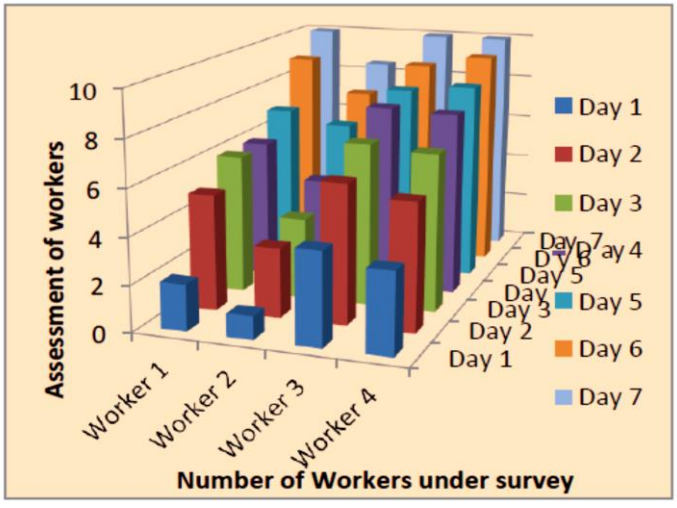

Fig.1.2: Problem with workers mutual relationship

From Fig. 1.2 one can observe that, the behavioral changes of the workers have increased little by little after providing gradual ethical teaching. However, the second worker has not attained the desired level as like other three workers. So, the quality of industrial environment somewhat better compared to earlier one.

CONCLUSIONS

As per the observations which have been carried out by our students the following conclusions are drawn.

1 The Production time of each mechanical component has reduced.
2 It has saved the worker's time.
3 Attitude and way of thinking of the workers have changed and behaves smoothly.
4 They have maintained ethical and respectable relationship with customers.

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JSESM

Journal of Scholastic Engineering Science and Management

January 2021, Volume 1, Issue 1, pp:14-22

"Influence of Hardening Process Over Modified Heat-Treated Carbon Steel Cutting Tool Materials"

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ABSTRACT

In this research work, we have found that tool wear rate of the materials of high-speed steel and Titanium alloy which are having optimum composition of carbon and other constituents. Here we have expounded the distinguishing characteristics of high-speed steel and Titanium alloys in respect to the tool wear. Subsequently, we have carried out heat treatment process, where two machined specimens were kept inside the muffle furnace once it attained required temperature, it was maintained at that temperature for a certain period of time and then cooled back to room temperature, we have conducted hardness test, tool wear test. In addition to these cutting operations have performed over mild steel and aluminum workpiece.

Keywords: *High Speed Steel, Titanium alloy, Tool wear, Heat Treatment*

I. INTRODUCTION

Well, since very long-time research has been taking place in the field of mechanical engineering, as we know that when the material is subjected to abnormal stress plastic deformation of material will take place causes wearing of material. So, there are some inevitable problems routinely occurred while performing metal sawing or cutting works. Viz…deposition of chips over the machined surface it engenders the decreasing the life span of the tool, improper supply of lubrication, indecorous of cutting tool geometry and many more. Thus, these problems engender wearing of tool materials and it decreases the life span of the cutting tool material. Concerning to machining process there are some factors we have taken into the account to drive the cutting process. The cutting parameters like cutting speed,

feed, and depth of cut, machinability conditions, type of metal cutting operations these factors which enhance the cutting process. Besides, cutting tool possess required properties like hot or red hardness, high resistance towards wear, resistance towards to abrasion, high bonding strength, low diffusion and adhesion property and high thermal conductivity and low coefficient of friction and many more. Referring to cutting process even a hard cutting material which is made out by Titanium or molybdenum alloy can contemplate sundry amount of decrease in tool life and increase of tool wear. So most often an optimum cutting condition could be maintained while performing cutting operations. So, in this respect there are vast tool materials available based on composition of a material the wear of the tool and life span of the too depends. As far as machining knowledge is concerned a lot of unpreventable factors which impact over tool wear and tool life, in this work we performed cutting operations on known materials like mild steel and aluminum where cutting conditions are optimum. In order to promote the tool life and decrease the wear rate thermal treatment operation was carried out to increase the hardness of a cutting tool material. The detailed work has been mentioned in following section. In the conceptions of materials engineering the several heat treatment processes enhances the material properties and gives the best Possible results. However, as a part of research work, we were carried out hardening operation which is used to enhance the hardness property of a material and hardness of a material was measured out by means of hardness testing machines these matters have been mentioned in impending section. Apart from carbon other constituents have been used in cutting materials which are used to promote other desirable characteristics like resistance towards corrosion, adhesion, abrasion, and improve Machinability and durability characteristics and many more.

II. EXPERIMENTAL METHOD

A. TOOL MATERIAL SELECTION

Any material which gets required shape because of cutting tool, so the choosing of material plays a crucial role for making cutting operations. The nominal compositions of high-speed steel and Titanium alloy is tabulated below. After obtaining required tool materials they are cleaned by means of chemical solution in order prevent the accumulation of unwanted tiny particles over given work piece then it is subjected to heat treatment process.

Fig.1.1: Ti-6Al-4V raw material

Fig.1.2: High Speed Steel raw material

Table 1: Nominal metal composition of High-Speed Steel (HSS Steel)

Material	C	Mn	Si	Cr	Ni	Mo	W	V
High Speed Steel	1.05	0.40	0.45	4.50	0.3	5.50	6.75	2.20

In the same manner, the chemical composition of Titanium alloy (Ti-6Al-4V) are mentioned below table.2

Table 2: Nominal metal composition of Titanium alloy (Ti-4V-6Al)

Material	Al	V	Ti
Titanium	6.0	4.0	Balance

B. HEAT TREATMENT PROCESS

Heat treatment is a process of combination of heating and cooling of a metal or alloy. By means of heat treatment the metal or alloys get required properties. So hardening operation was carried out above isothermal temperature in order to enhance the material property. In this respect, initially the machined specimens were kept inside the muffle furnace it was held above isothermal temperature line for certain period of time after that it cooled in water for some time. It was allowed for cooling for some time as a result of that there is massive changes have been taken place over cutting tool materials. The muffle type heat treated furnace is shown in Fig.3. In the meantime the hardness of a material is increased, it is known by making hardness test over the modified heat treated high speed steel and Titanium alloy.

Fig.1.3: Muffle Type of Heat-Treated Furnace

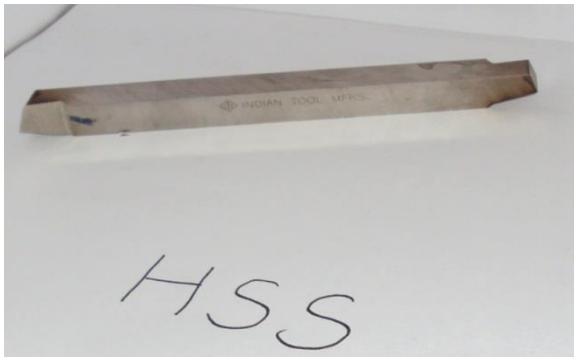

Fig.1.4: High Speed Steel Heat Treated Finished Tool

Fig.1.5: Ti-6Al-4V Heat Treated Finished Tool

III. MATERIAL CHARACTERIZATION

A. Hardness Test

Fig.1.6: Rockwell Hardness Testing Machine

There are several hardness testing machines can be seen. Amongst all, Rockwell hardness test gives arbitrary readings. Unlike other hardness testing machines Rockwell hardness testing machine does not need surface preparation of the workpiece. Firstly, the workpiece was placed upon the machine, the dial in the machine can show any reading, further hand wheel was rotated, thereby workpiece moved up towards against to the ball indenter until needle on the dial reads zero this applies minor load. Later, major load was applied by means of pressing the crank which was located at right hand side of the machine. Further, the crank is turned in reverse direction thereby withdrawing major load but leaving minor load. Then hand wheel was rotated in turns workpiece was lowered. During this stage hardness of the workpiece is directly obtained from dial scale.

B. Tool wear

Concerning to tool wear, it is a rapid failure of material by means of indecorous machinability conditions. As cutting speed of cutting tool increases the wearing of cutting will be greater. So an optimum cutting speed is maintained to eradicate loss of tool. So as far as machining knowledge is concerned tool wear also depends upon the machining time as machining time goes on increasing the tool wear rate would be high. So, in this respect measurement tool wear is found by grooving and indentation method and by optical microscopic method usually fitted with micrometer. The measurement of tool wear by optical microscope is shown in Fig.1.7.

Fig.1.7: Optical microscope with 8X magnification

Table 3: Tool Flank wear rate of High-Speed Steel and Titanium alloy

Work Piece	Cutting Material	Speed (RPM)	Feed (mm/Rev)	Depth of Cut (mm)	Time Elapsed (Min.)	Flank wear rate (mm)
Mild Steel	**High Speed Steel**	71	0.4	1.0	**3**	**0.6**
					6	**0.8**
					9	**0.88**
					12	**1.3**
					15	**1.9**
					Max. Wear Rate: 1.26×10^{-4} m/min	
Al	**Titanium Alloy**	71	0.4	1.0	**3**	**0.3**
					6	**0.55**
					9	**0.66**
					12	**0.7**
					15	**0.79**
					18	**1.0**
					21	**1.4**
					24	**1.6**
					27.33	**1.9**
					Max. Wear Rate: 1.35×10^{-4} m/min	

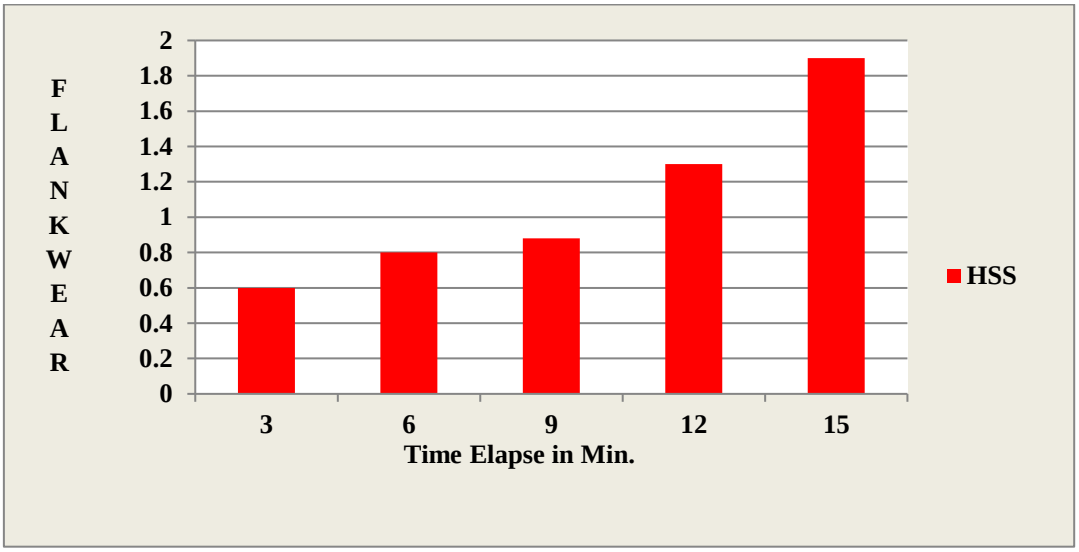

Fig.1.8: Rate of flank wear on High Speed Steel (Max. Wear rate 1.26×10^{-4} m/min)

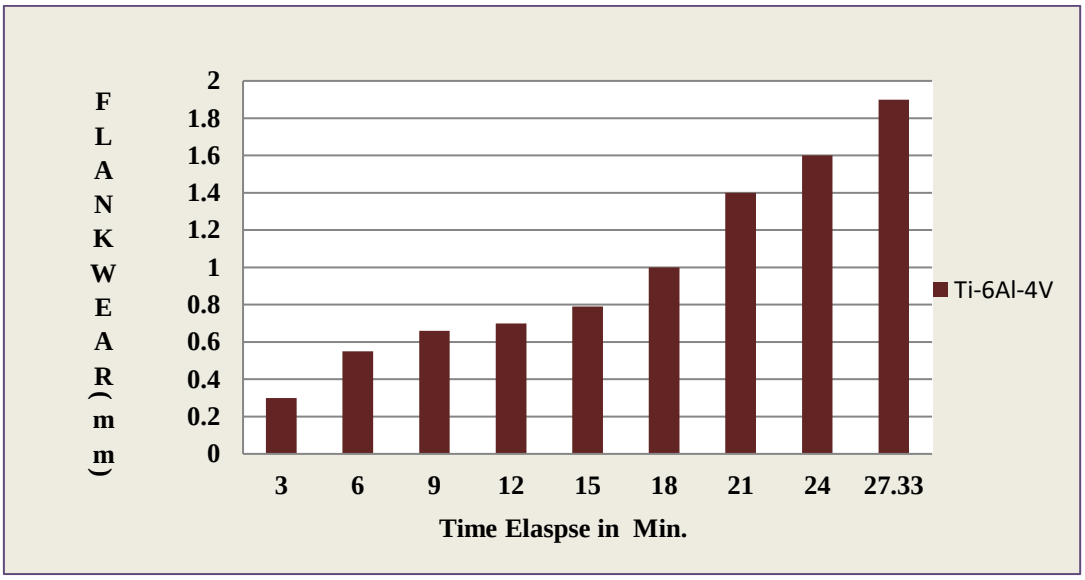

Fig.1.9: flank wear rate on Ti-6Al-4V (Max. Wear rate 1.35×10^{-4}m/min)

From the Fig.1.8 and 1.9 one can notice that the wear rate of a high-speed steel cutting tool has the lowest wear rate than titanium alloy. As the machining time of both high-speed steel and titanium alloy cutting tool increases the wear rate also increased. In this respect the wear rate of high-speed steel is measured by taking mild steel as a tested specimen the maximum wear rate was (**1.26×10^{-4} m/min).**

Like high-speed steel, the wear rate of titanium alloy is measured by taking aluminum as a tested specimen the maximum wear rate is **(1.35×10^{-4}m/min).** At exactly 5 Minutes the wear rate was more for high-speed steel cutting tool and at exactly 27.33 Minutes the wear rate is 1.9. Due to phenomenon of adhesion and diffusion would be more in titanium alloy than high speed steel cutting tool.

CONCLUSIONS

1. The wear rate of Titanium alloy is found higher than high speed steel cutting tool.
2. After carrying out of heat treatment process the wear rate has reduced fully.
3. Diffusion and adhesion wear mechanism was observed.
4. At high cutting speed the titanium alloy is found that it has higher shear force than high speed steel cutting tool.
5. Wear rate of high-speed steel cutting tool on mild steel work piece is lower than Titanium alloy.

FUTURE SCOPE

1. By the method of coating process, the life span of the cutting tool shall be increased.

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JSESM

Journal of Scholastic Engineering Science and Management

January 2021, Volume 1, Issue 1, pp:23-28

"Realistic case study of transmutation of coke dry quenching expulsion facility to lessen the maintenance work and augment the performance of Vibro feeder line pipe in the department of mechanical coke ovens"

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ABSTRACT

The common problems which are found while charging of coke into the chamber are failure of electrical cables and sensors. However due to paucity of discharging facility at Vibro feeder line pipe, causes the damage of Vibro feeder line as well as obstruction for smooth flowing of dust into the de dusting chamber. So, by increasing the angle of Vibro Feeder line pipe, causes smooth flowing of dust as well as enhance the performance of Vibro feeder line in a demure manner.

Keywords: *Coke Quenching; Vibro feeder line, CDQ Chambers*

I. INTRODUCTION

In view of mechanical engineering prospects, there are some inevitable problems which are commonly encountered while performing any manufacturing operations. Either it is related to Production sector or design sector or thermal sector. As far as metallurgical industry knowledge is concerned there are some unknown issues which encompass number of problems where finding the desired solution for the given problem may be easy or difficult. So, in steel industry several systems

to integrate the channels of different sections where product for raw material is existed. So, in this view we have been taken keen interest over coke dry quenching (CDQ) systems, where the inert gas likes nitrogen used as cooling media for the recovery of sensible heat for the power production, steel production. So, in this regard there are several components are considered for the production of power and steam for the various purposes. Therefore, the sub units of coke dry quenching plant have several sub units those are namely Loco and Bucket units, crane, dust collector, gas blowing pipe, conveyor system, primary dust catcher system, secondary dust catcher system, rotary seal valve unit and boiler units and Vibro feeder line pipe and many more. So, after considering all the sub unit parts eventually, one can say that for the smooth functioning of Coke Dry Quenching unit requires periodic inspection and maintenance and also it enhances the productivity of blast furnace an integrated steel industry. So as far as coke dry quenching knowledge is concerned, loco and bucket subunits play an imperative role to perform even function of quenching process. In a mechanical oven or coke oven plant, before the obtaining requisite amount of coke, it is necessary to meet coalification process, where coal is in the form powder which is to be crushed for a while to purify the coal, and then coal is to be charged into the coke oven plant by means locomotive handling systems. The coal is heated to a temperature of 7000C-8000C. As par with temperature the coal is subjected to under compressive action without applying any pressure or temperature. Later the heated or hot coke gets solidified which is ready to supply for several applications purposes. In this connection the employing different sub unit systems like continuous use of locomotive systems, Bucket systems for lifting the hot coke from bottom level to top level by means motor driven crane impacts more on productivity of a system. Great care must be taken for handling these systems, if not; there is a lot evils will get into the depiction and maintenance of loco and Bucket is mandatory for our day-to-day industrial activities. The principal reason for the collapse of locomotive is owing to falling off liner plates from the bucket and revamping of aforementioned subunit takes more time for freezing of bucket, Decorous alignment of liner plates, setting up of crane facility as in the orientation of bucket. So, there are several problems can be notified by making regular inspection and observation process. While discharging of hot coke into the chamber a great deal of evils principally existed at Vibro feeder line pipe, Thus, Vibro feeder line pipe plays an imperative role to move the dust in a pipe into the de dusting chamber. Due to paucity of Vibro feeder line pipe angle more quantity of dust may collect, results, damage of Vibro feeder line pipe as well as lessens the production rate. In order to overcome this tribulation, innovative techniques have espoused.

II. PRESENT WORK

As far the requirements, the Jindal Steel Work Ltd. (J.S.W) has four numbers of coke dry quenching units (CDQ), and the coke dry quenching in JSW it is more advanced, it is possessing reliable technology to obtain metallurgical coke.

Fig.1.1: JSW Coke ovens of CDQ3&4

a) Problems Identified

With respect to the coke oven systems, we have identified number of problems which are being associated with Vibro feeder line. Problems have been enlisted below.

- Due to Paucity of discharging facility in Vibro feeder line owing to
- Dust unruffled & weary in to de-dusting mains.
- Drain line gets suffocated due to angle of repose for dust flow.
- Choked lines manacle the performance of Vibro-feeder indirectly impede the coke discharge with heating up of coils.
- Stoppage of coke discharge leads to production loss.

Fig.1.2: JSW Coke ovens Vibro-Feeder line

Fig.1.3: JSW Coke ovens Vibro-Feeder line inner view

As per the coke dry quenching knowledge is concerned, due to paucity of discharging facility in Vibro feeder line the recurrent tribulations will be occurred, which leads to stoppage of production and reduces the productivity of the system. So, in this esteem, it is needed to modify the system in a decorous manner by keeping all the required constraints in a common platform. So, in a present existing Vibro feeder line, there are some innovative modifications have made to overcome such problem. These detailed modifications have expounded in impending section.

III. MODIFICATIONS

At the zone of Vibro feeder line part, by means of increasing the angle of connecting pipe, the dust which is flowing inside the Vibro feeder line pipe will move smoothly as well as directly it reaches the dedusting chamber. As a result of this, damages across the Vibro feeder line pipe and enhances the efficiency of a system.

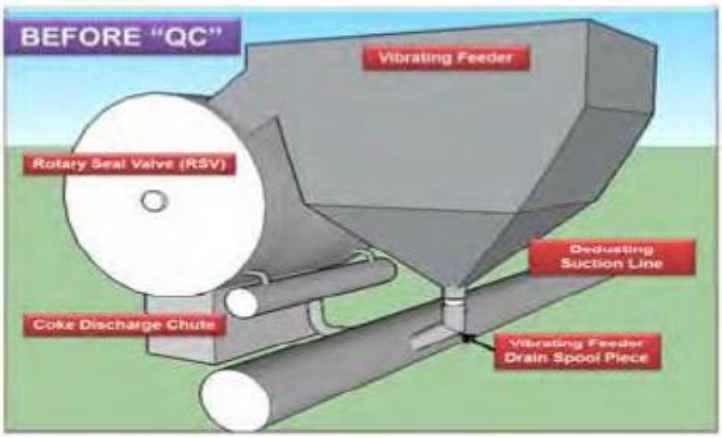

Fig.1.4: Vibro-Feeder line modified view

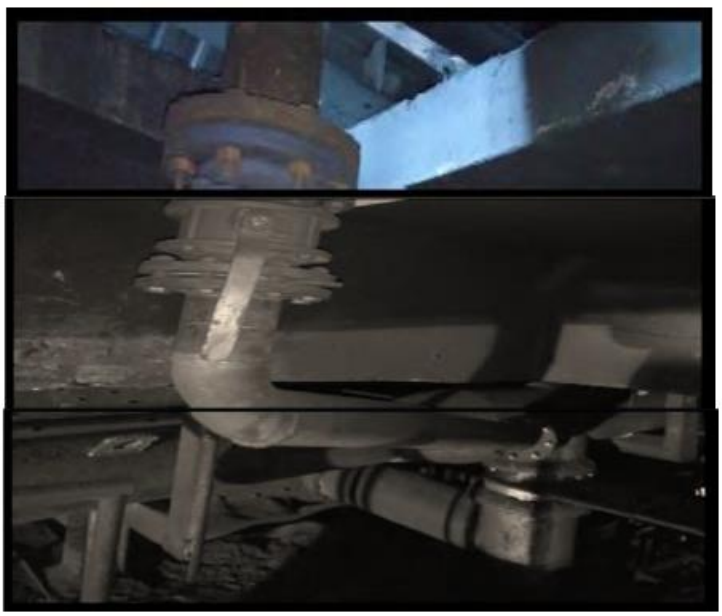

Fig.1.5: Physical Setup of Vibro feeder line

Fig.1.5 shows the physical setup of Vibro feeder line, in which angle of connecting pipe has wholly increased thereby reducing the damage of feeder line pipe as well as enhanced the smooth flow of dust into the de dusting chamber.

CONCLUSIONS

Based on scrutiny following conclusions were drawn:

1 It greatly enhanced the performance of Vibro Feeder.

2 Greatly reduced the coil temperature.

3 The suction pressure has greatly enhanced.

4 Greatly reduced the recurrent damages across the Vibro feeder line.

5 Conveyor stoppage has wholly reduced.

6 Enhanced the production rate of a tailored system.

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JSESM

Journal of Scholastic Engineering Science and Management

January 2021, Volume 1, Issue 1, pp:29-37

"Impact of thermal treatment process over carbon based single point cutting tool"

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ABSTRACT

In this research work, we have found that tool wear rate of the materials of high-speed steel and Stainless steel of 440C Grade which are having optimum composition of carbon and other constituents. Here we have expounded the distinguishing characteristics of high-speed steel and Stainless Steel in respect to the tool wear. Subsequently, we have carried out heat treatment process, where two machined specimens were kept inside the muffle furnace once it attained required temperature, it was maintained at that temperature for a certain period of time and then cooled back to room temperature, we have conducted hardness test, tool wear test. In addition to these cutting operations have performed over mild steel workpiece.

Keywords: *High Speed Steel, Stainless Steel (SS440C), Wear Rate*

I. INTRODUCTION

In light of growing technology there are different facilities can able to acquire directly and indirectly from available resources. Earlier century, people were facilitated traditional technology to do desirable task but now it is wholly replaced by new modern technology daily human beings are fully depending on technology. Technology not only satisfies ethical task but it gives an idea how to discover new thing and how we need to take a control over new system. As far as newly discovered product rate of material is concerned the demanded product would have highest package in market as compared to exist one. So, in this connection as we know that there are various materials would have known for their best properties. In view of current technological aspects what we observed in the late nineties that were limited to certain extent. But now due to faster rate of growing technology our engineers

are well known across the world for their keen interest to take bold step to discover something. In the area of mechanical engineering several manufacturing systems have been developing since very long time those manufacturing process played vital role to enhance the value of product both in qualitatively and quantitively. An effective way of explanation is needed to disclose the mechanical properties of any metal or alloys. In order to alter the mechanical characteristics, there are various and several methods could be seen those are alloying process, Recrystallization Process and Heat Treatment process. However, some hindrances could be seen to achieve desirable mechanical characteristics. Many industrialists made investigation over cutting tool materials, thereby attaining desired properties over cutting tool materials heat treatment operations have been carried out. These operations have been made impact over cutting materials in increasing the hardness, toughness, tensile strength and other properties. When we talk about machining there are non-evicted things commonly encountered. Thus, the ratio of product outcome to product income may give us lesser productivity as we do not eradicate these problems. Before we met technology our ancestors were used to bring sharp tools which were being used to cut the materials and also used to kill the animals to lead the life. As technology grows, the human has facilitated different technological items which are used in engineering area. While performing machining over any metal or alloy by means of cutting tool at shear zone an enormous amount heat may be generated. As a result, cutting will take place. There are some factors shall consider into our account to perform cutting action. In machining era there are cutting speed, feed, depth of cut, the direction of cutting operation, type of metal, type of cutting tool material and other factors will be considered deeply. Some other aspects shall also be considered in order to out root the wearing of tool and machined surface. There are various machine tools are available in order to perform machining operation over any material those are Lathe Machine tool, Milling, Drilling, Grinding, boring, planning, and shaping etc... So in this connection being an engineer we have to take a keen and attentive look over cutting material rather than the type of work piece used for machining operation.

II. EXPERIMENTAL SET UP

A. Tool Material Selection

Any material which gets required shape because of cutting tool, so the choosing of material plays a crucial role for making cutting operations. The nominal compositions of High-speed steel and Stainless Steel is tabulated below. After obtaining required tool materials they are

cleaned by means of chemical solution in order prevent the accumulation of unwanted tiny particles over given work piece then it is subjected to heat treatment process.

Fig.1.1: High Speed Steel raw material

Fig.1.2: High Speed Steel raw material

Table 1: Nominal chemical composition of High-Speed Steel (HSS Steel)

Material	C	Mn	Si	Cr	Ni	Mo	W	V
High Speed Steel (HSS Steel)	1.05	0.40	0.45	4.50	0.3	5.50	6.75	2.20
Stainless Steel (SS440C)	0.08	2.00	1.00	18.0	0.045	12.0	---	---

B. Heat Treatment Process

Heat treatment is a process of combination of heating and cooling of a metal or alloy. By means of heat treatment the metal or alloys get required properties. So hardening operation was carried out above isothermal temperature in order to enhance the material property. In this respect, initially the machined specimens were kept inside the muffle furnace it was held above isothermal temperature line for certain period of time after that it cooled in water for

some time. It was allowed for cooling for some time as a result of that there is massive changes have been taken place over cutting tool materials. The muffle type heat treated furnace is shown in Fig.1.3. In the meantime, the hardness of a material is increased, it is known by making hardness test over the modified heat-treated high-speed steel and Stainless Steel.

Fig.1.3: Muffle Type of Heat-Treated Furnace

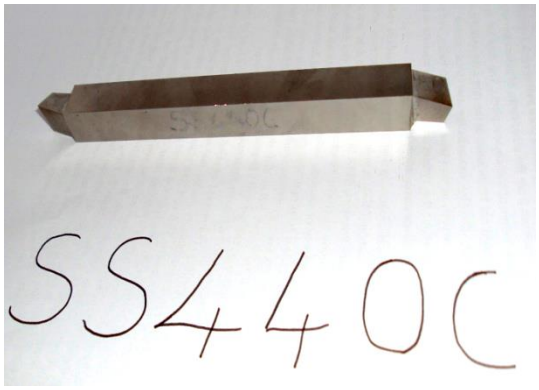

Fig.1.4: SS440C Heat Treated Finished Tool

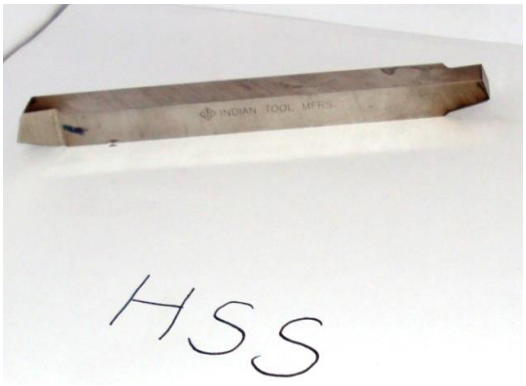

Fig.1.5: High Speed Steel Heat Treated Finished Tool

III. MATERIAL CHARACTERIZATION

A. Hardness Test

Fig.1.6: Rockwell Hardness Testing Machine

There are several hardness testing machines can be seen. Amongst all, Rockwell hardness test gives arbitrary readings. Unlike other hardness testing machines Rockwell hardness testing machine does not need surface preparation of the workpiece. Firstly, the workpiece was placed upon the machine, the dial in the machine can show any reading, further hand wheel was rotated, thereby workpiece moved up towards against to the ball indenter until needle on the dial reads zero this applies minor load. Later, major load was applied by means of pressing the crank which was located at right hand side of the machine. Further, the crank is turned in reverse direction thereby withdrawing major load but leaving minor load. Then hand wheel was rotated in turns workpiece was lowered. During this stage hardness of the workpiece is directly obtained from dial scale.

IV. RESULTS AND DISCUSSIONS

A. Tool wear

Concerning to tool wear, it is a rapid failure of material by means of indecorous Machinability conditions. As cutting speed of cutting tool increases the wearing of cutting will be greater. So, an optimum cutting speed is maintained to eradicate loss of tool. So as far as machining knowledge is concerned tool wear also depends upon the machining time as machining time goes on increasing the tool wear rate would be high. So, in this respect measurement tool wear is found by grooving and indentation method and by optical

method usually fitted with micrometer. The measurement of tool wear by optical microscope is shown in Fig.1.7.

Fig.1.7: Optical microscope with 8X magnification

The values of tool wear have been tabulated in table 3

Table 3: Tool Flank wear rate of High-Speed Steel and Stainless Steel (SS440C)

Work Piece	Cutting Material	Speed (RPM)	Feed (mm/Rev)	Depth of Cut (mm)	Time Elapsed (Min.)	Flank wear rate (mm)
Mild Steel	High Speed Steel	71	0.4	1.0	3	0.6
					6	0.8
					9	0.88
					12	1.3
					15	1.9
					Wear Rate: 1.26×10^{-4} m/min	
Mild Steel	Stainless Steel (SS440C)	71	0.4	1.0	3	0.3
					6	0.55
					9	0.66
					12	0.7
					14	0.79
					Attained Wear Rate:0.52×10^{-4} m/min	

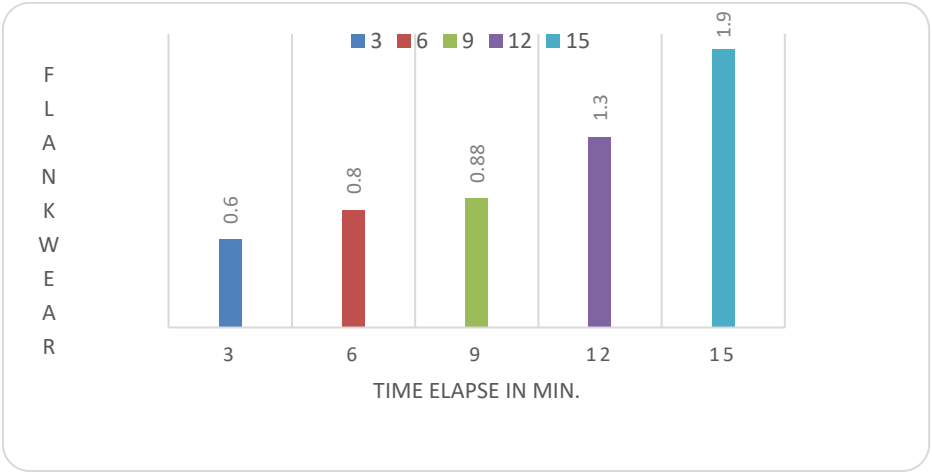

Fig.1.8: Flank wear rate on High Speed Steel (Max. Wear rate 1.26×10^{-4} m/min)

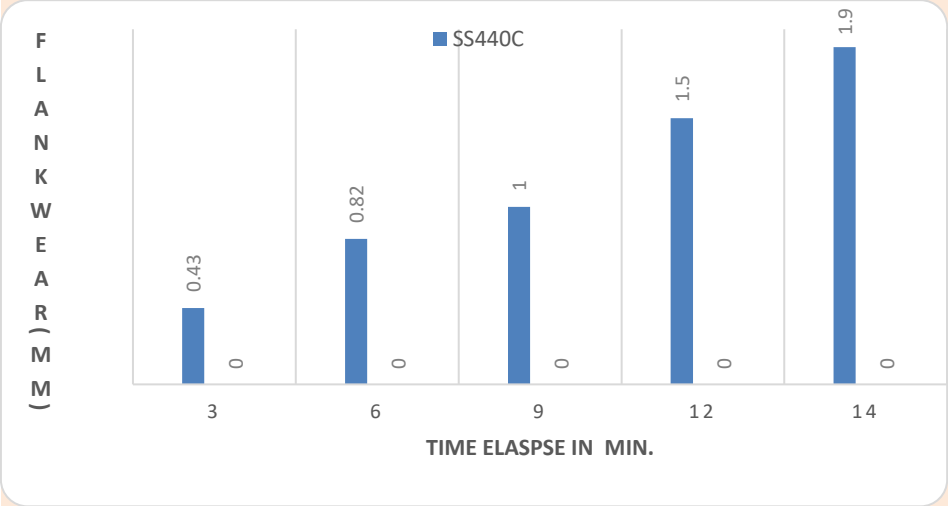

Fig.1.9: Flank wear rate on Stainless Steel (Max. Wear rate 0.52×10^{-4}m/min)

From the Figure 1.8 and 1.9 one can notice that the wear rate of a high-speed steel cutting tool has the lowest wear rate than Stainless Steel. As the machining time of both high-speed steel and Stainless-Steel cutting tool increases the wear rate also increased. In this respect the wear rate of high speed steel is measured by taking mild steel as a tested specimen the maximum wear rate was (**1.26×10^{-4} m/min).** Like high-speed steel, the wear rate of Stainless Steel is measured by taking mild steel as a tested specimen the wear rate is (**0.52×10^{-4}m/min).** At exactly **5 Minutes** the wear rate was more for high-speed steel cutting tool and at exactly **14.00** Minutes the wear rate is more Due to phenomenon of adhesion and diffusion would be more in Stainless Steel (SS440C) than high speed steel cutting tool.

CONCLUSIONS

1. The wear rate of High-Speed Steel is found higher than Stainless steel cutting tool.
2. After carrying out of heat treatment process the wear rate somewhat reduced
3. Diffusion and adhesion wear mechanism was observed.
4. At high cutting speed the High-Speed Steel is found that it has higher shear force than Stainless steel cutting tool.
5. Wear rate of Stainless-Steel cutting tool on mild steel work piece is lower than High Speed Steel.

FUTURE SCOPE

1. By the means of coating process, the life of the cutting tool would be increased.

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